

Smart pumps: The smart choice for agricultural irrigation



With more than 600,000 pumps used to irrigate agricultural land across the country, it's clear they are a universal hero in keeping crops, livestock, farming operations, and farming families hydrated and thriving. In the Western United States, farmers have experienced increasing temperatures and arid weather conditions which cause ongoing droughts. Available water is also lost to natural processes such as evaporation and ground seepage, which – according to Idaho National Laboratory – accounts for the loss of up to 30% of water used for irrigation.¹

Different types of pumps

Although pumps can't combat or eradicate natural processes, finding the right pump for your needs can not only move water when and where you need it, but save energy and money, and reduce carbon emissions.

Agriculture applications typically use centrifugal pumps to move ground- and shallow-surface water. Deep-well turbines, submersibles, and propellers are also commonly used for irrigation.

When selecting the type of pump that is best for your needs, it is important to remember the conditions in which the pump will be used, including²:

- Water source, depth, location, and travel distance.
- Required pumping flow rate, which is determined by the system pressure and flow requirements.
- Total lift from the water surface to pump intake, also called total suction head.
- Total pressure the pump will supply, commonly referred to as the total dynamic head.

Making the case for more efficient pumps

Regulatory changes to water rights, shifting irrigation districts, recurring regional droughts, and ongoing conservation efforts are only a few reasons smart pumps should be considered for your agricultural irrigation applications. Replacing older, inefficient pumps in irrigation systems and converting from aging pipes and open canals to closed plastic pipes can potentially save \$2.8 billion in energy costs, and reduce carbon emissions by 9.9 million tons.³ Let's look at the types of changes that can be made and the challenges they address.

¹[Irrigation Systems Reimagined](#), Idaho National Laboratory

²[How to Choose the Right Agricultural Pump, Pumps & Systems](#), November 30, 2018

³[Pumps in Agricultural Irrigation: Is Groundwater the Primary Source of Irrigation? Pumps & Systems](#), October 11, 2023

Challenge:

Wasted water and high energy use

Water wasted by inefficient irrigation systems can also lead to groundwater issues, not having enough water for productive crops and healthy livestock, and soil degradation. A recent study shows these systems “waste 52% of their energy every year but converting to more efficient systems, including pumps and pipes, can realize greater energy and cost savings.”⁴

Solution:

Upgrading pump systems/installing drives and controls

A Variable Frequency Drive (VFD) controls the speed at which an electric motor rotates by managing the frequency of power supplied to the motor. Using a drive to control the speed of a pump’s motor can have multiple benefits, including:

- **Save water:** Delivering the right amount of water where and when needed – which helps mitigate overwatering some areas and underwatering others – is easier with systems that include VFDs for precision irrigation.
- **Save money:** Upgrading systems to improve pump efficiency and adding VFDs could save farmers up to \$1.8 billion annually in energy costs. This type of improvement would typically pay for itself in under than two years.⁵
- **Plan for the future:** Additionally, deploying VFDs can help accommodate other system changes, such as implementing new control strategies or joining a demand response program, without having to change the pump, which helps future-proof your system.

⁴ [Ag Pumps Study Details Surprising Energy Savings](#), Hydraulic Institute, December 15, 2022.

⁵ [Pump system opportunities in irrigation](#), Hydraulic Institute, December 12, 2023

Challenge:

Older systems and failing parts

Farmers are busy tending to their land and don’t have a lot of time to deal with failed or aged-out components. A common practice for many is to fall back on rebuilding and replacing broken or malfunctioning parts, as needed. While that may be the preference for many due to familiarity with specific products, this might not be the optimal scenario for keeping a farm’s critical pumping systems in working order.

Solution:

Retrofit obsolete pumps with newer, more efficient technologies

Newer systems aligned with current technology options and capabilities present advanced options to tailor and improve flow to your specific needs, increase efficiency, reduce time lost from trying to find antiquated parts that may no longer be on the market, and mitigate excess water loss. Advanced pump controls can allow users to monitor the functionality, operations, and maintenance needs of the system from their smartphone. [VFDs also offer fast installation, balancing, and commissioning.](#) In turn, these features can help reduce the amount of labor and the costs associated with overseeing irrigation.



Challenge:

Oversized systems

Many systems are oversized from the time of installation. Although you may be tempted to think bigger is better, that is not always the case. Even though a larger system has the ability to move higher volumes of water at higher pressures, if it is not well matched to the needs of the specific application, you risk overloading the motor and experiencing cavitation. Your system may also overheat, damage, face frequent breakdowns, and experience increased maintenance calls.

Solution:

Right-sizing for your application

Using a smart pump can help you operate as close to the [Best Efficiency Point](#) as possible. As technology evolves and regulatory requirements change, you may discover your system no longer works to your advantage – particularly when it is oversized and older. Ultimately, a right-sized system – where the pump and system curves are balanced each to the other – can mitigate wasted energy, wear and tear, operational strain, and can deliver improved performance for the pump and its connected components.



Water pumping is an essential need for most American farms, whether they are growing food crops, flowers and plants, or supporting livestock operations. Relying on outdated systems can not only hinder water delivery and contributes to high energy use, wasted water, and frustrating maintenance issues that can lead to crop losses. Your local utility may provide information about available programs or incentives to help with your agricultural irrigation needs.



© 2024 BetterBricks